DRISI

Caltrans Division of Research, Innovation and System Information

Research Results

Dispersion Patterns of Mobile Source Air Toxics Near Highways

Understanding how MSAT emissions behave

Planning/ Policy/ System Information

JANUARY 2015

Project Title:
Mobile Source Air Toxics (MSAT) from Major Highways, TPF-5(170)

Task Number: 1651

Start Date: March 1, 2008

Completion Date: December 31, 2013

Product Category: Improved technical standard, plan, or specification

Task Manager:
Patrick Tyner
Associate Transportation Planner
patrick.tyner@dot.ca.gov

WHAT WAS THE NEED?

In 2002, the Sierra Club challenged the Federal Highway Administration (FHWA) and the Nevada Department of Transportation's environmental report concerning the proposed widening of U.S. 95 in Las Vegas, Nevada, and the assessed impact of mobile source air toxics (MSAT) from the project. MSATs are compounds emitted from highway vehicles that are known or suspected to cause cancer or other serious health and environmental effects. MSATs also contribute to precursor emissions that react to form secondary pollutants. As part of the lawsuit settlement, the FHWA agreed to undertake a study to evaluate MSAT emissions and their dispersion patterns. The FHWA contacted all 50 states regarding participating in this research study. Nevada and Michigan volunteered to support a monitoring site, while a number of other states, including California, provided funding for the project.

WHAT WAS OUR GOAL?

The goal was to enhance Caltrans' ability to better understand and assess a wider range of air emission impacts near state highways.

Caltrans

Caltrans provides a safe, sustainable, integrated and efficient transportation system to enhance California's economy and livability.

Dispersion Patterns of Mobile Source Air Toxics Near Highways

Research Results

WHAT DID WE DO?

The FHWA, in conjunction with a consortium of federal agencies and state departments of transportation, evaluated MSATs at two sites, one in Las Vegas along I-15 and the other in Detroit on I-96, areas that differ greatly in geography and climate. To conduct the study, the FHWA outlined a detailed monitoring protocol to establish a uniform approach for measuring the impact and behavior of particulate matter with aerodynamic diameter less than 2.5 microns and MSAT compounds near highways. The protocol was peer-reviewed by other federal agencies, state environmental and transportation agencies, the Sierra Club, and academic institutions. The objective was to determine MSAT concentrations and variations as a function of distance from the highway and the effect of highway traffic flows and meteorological conditions. Data was gathered by placing instruments 10, 100, and 300 meters from the roadway. Researchers also measured wind speed, wind direction, and roadway characteristics, such as traffic counts, speed, and vehicle types.

WHAT WAS THE OUTCOME?

The study identified modeling techniques to collect MSAT data and confronted some of the challenges that researchers have to overcome and adapt to, both technically and programmatically. Preliminary study results indicate that highway vehicle emissions impact near-road air quality, and concentrations tend to decrease further away from the road. Additional analysis is needed to more accurately quantify the effect of wind speed and other non-highway sources, such as nearby parking lots and traffic from adjacent roadways. For both study sites, concentration gradients for gaseous pollutants associated with the distance from the roadway and higher pollutant concentrations with higher traffic volumes were observed.

WHAT IS THE BENEFIT?

The FHWA study enhanced the understanding of MSAT emissions associated with major highway facilities. During the development of both new and upgraded highway projects, it is important to understand how these emissions impact the surrounding communities. This information helps to better address the concerns of those living near highways and mitigate potential health hazards. The research identified the process of collecting MSAT data in different geographic environments, which Caltrans can apply in the analysis of future projects to make more informed decisions. Ultimately, the people of California gain by having a transportation system that takes both sustainability and public health concerns into account.

LEARN MORE

To view the pooled fund reports:
www.pooledfund.org/Details/Study/397